Managing systemic risk using systems thinking in practice

1st Global Conference on Environmental Studies 2013*

Managing systemic risk using systems thinking in practice

Martin Reynolds

The Open University, Milton Keynes, MK7 6AA, UK

Abstract

Managing uncertainties associated with, say, water security, toxic wastes, or biotechnology, invites growing relevance from the field of complexity sciences that everything is connected. Systems ideas such as complex adaptive *systems* or the eco*systems* approach have consequently gained attention in recent years for promoting more joined-up thinking. But such ideas of systems have limited currency. Issues about interconnections – and calls for joined-up thinking – ought not to be seen in isolation from related systems issues of multiple values and different stakeholder perspectives. Moreover, such issues are related to political issues of partiality and selectivity – that is, system boundary judgements that circumscribe perspectives. A practical dimension of systems thinking using the metaphor of conversation and creative space prompts a more systemic appreciation of real world interconnections *in relation to* multiple perspectives and boundary judgements. Systems thinking in practice provides a more appropriate systemic space for managing systemic risk.

Keywords: systemic risk; metaphor of conversation; creative space; systems thinking in practice; multiple perspectives; boundary judgements.

1. Introduction

> "Clear systems thinking is one of the basic literacies of the modern world… not least because it offers unexpected insights that are not amenable to common sense" (Mulgan, 1997).
>
> "Systems thinking ... is an important way to assess and manage new risks and uncover risks that were previously unidentified. For example, a company may understand its direct dependency on water, but may not have thought about how the supply of its material resources could be impacted by increasing water scarcity." (KPMG International, 2012 p.4)

KPMG International - the influential public accounts company - identified the core importance of systems thinking in their report *Expecting the Unexpected*. The report identifies 10 megaforces of risk -climate change, unpredictable energy supplies, material resource scarcity, water scarcity, population growth, wealth, urbanisation, food security, ecosystem decline, deforestation – which they claim will impact business over the next 20 years: "These forces do not act alone in predictable ways. They are interconnected. They interact." (ibid). Risk here is clearly associated with uncertainty – unforeseen events, unintended consequences, unexpected outcomes.

* 24-27 April 2013 Belek-Antalya, Turkey

Managing such risks has increasingly meant attending to the 'butterfly effect'; [1] everything is connected, interrelated, and interdependent. Systems approaches and ideas such as complex adaptive systems (cf. Levin, 1998) and/or the ecosystems approach (cf. Defra, 2013) have consequently gained attention in recent years for promoting more joined-up thinking. KPMG International for example propose what they call the Nexus approach (used by the World Economic Forum) for identifying connections amongst the ten megaforces of uncertainty. But ideas of systems as constituting holistic joined-up-thinking alone have limited currency.

At one level of analysis, systemic risks are indeed associated with not attending to more holistic endeavours as espoused, for example, in triple bottom line thinking. So managing *environmental* risks cannot be achieved outside of managing *economic* risks of, say, the collapse of financial institutions, and/or *social* risks associated with, say, poverty and social exclusion. But at another level of practical engagement, managing systemic risk also cannot be undertaken by simply understanding interconnections alone in isolation from appreciating related issues of multiple values and different stakeholder perspectives on those interconnections. Moreover, such issues are related to political issues of partiality and selectivity that circumscribe perspectives – boundary judgements. What is required is a shift from appreciating systems thinking as a mere discipline – or even an interdisciplinary endeavour helpful for joining other disciplines - towards systems thinking as a transdisciplinary literacy.

This paper describes the basic contours of such a literacy as a framework of praxis using the metaphor of conversation. The framework suggests an important interplay between understanding and practice - *thinking* continually informed, moulded and (re)shaped by ongoing reflective *practice*. (cf Reynolds and Howell, 2010; Reynolds, 2011). The three core aspects of the framework are described in terms of developing and nurturing a creative space – similar to that developed in human conversation. Creative space is described in three dimensions – ecological, learning, and political (Reynolds et.al., 2009)– respectively associated with three core aspects of systems thinking in practice - understanding, engagement, and reflection.

2. Ecological space: understanding factual judgements and conversing with nature

Much of what constitutes informed policy making around environmental decision making centres on contested debates that merely reinforces an alienation of an environment comprising the natural world of life and life support in which humans are an integral part. Stephen Talbott illustrates the dilemma in a well-crafted essay in making the case for an 'ecological conversation': "a creative tension, a progressive and mutual deepening of insight, a sense that we are getting somewhere worthwhile." (Talbott, 2004 p.40). Talbott invites us to explore the relationship with the ecological world – the Other - in terms of human conversation. The metaphor of conversation provides the means for identifying a more responsible engagement with environment.

In developing a framework for ecological conversation from a systems perspective, three entities are required (i) the context or 'objects' of conversation –the interrelated socio-ecological issues that need surfacing; (ii) the agency of conversation – people interacting and learning together; and (iii)

[1] Edward Lorenz (1917–2008) was a pioneer in the field of chaos theory and the originator of the term 'butterfly effect' in a 1972 conference paper suggesting that very small changes in a natural system (e.g., butterfly wings flapping in Brazil) can have very large and unexpected consequences (tornados in Texas).

ideas or tools for mediating conversation – conceptual constructs such as 'systems' that can help generate a continual sharing of understanding and practice.

An extra-conceptual realm of context is sometimes demarcated from the more conceptual realm by a convention of reverence through use of upper-case initials. For example, Talbott himself uses the notion of the Other. Edward Said in exploring Western conceptions of non-western Islamic cultures famously distinguished between notions of the Other – representing unfamiliar cultures – with conceptual constructs of 'orientalism' (Said 1979). In a similar way, the psychoanalytical work of Slavoj Žižek demarcates actual realities - 'the Real' - from ideological constructs of 'realities' (Žižek 1989), and Kate Soper (Soper 1995) makes a distinction in appreciating how we construct environmental narratives, signalling a difference between the extra-discursive material realm of Nature compared with conceptual 'nature' narratives. The degree to which Nature, the Real or the Other occupy a wholly extra-discursive realm is debatable since the formulation of these dualistic pairs are themselves discursive expressions. But the important point is to acknowledge a context that exists outside of any one reference system (Figure 1).

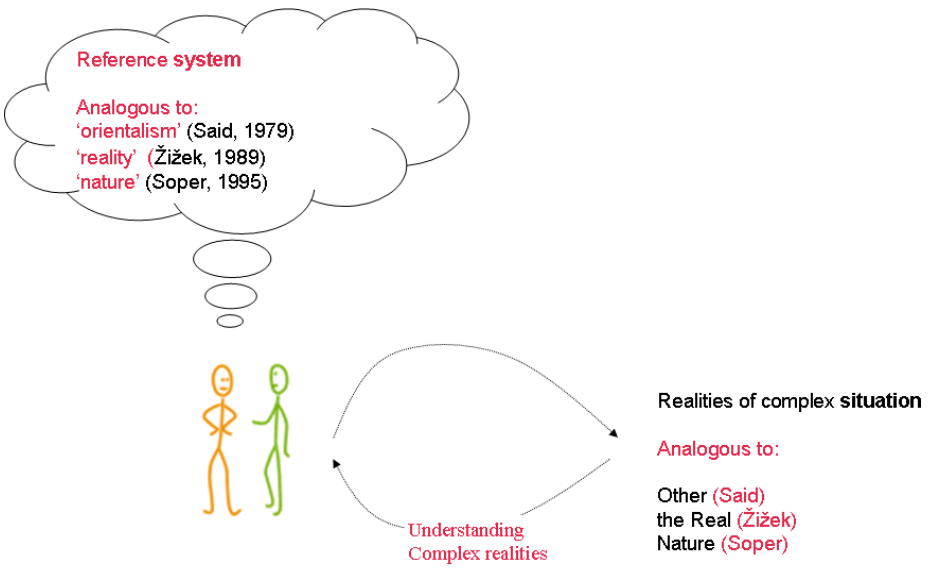

Figure 1 Framing complex situations of change and uncertainty

Much of what is considered Nature is often codified as 'systems' – natural systems, ecosystems, ecological systems and/or environmental systems. Systems thinking is an active cognitive endeavour to conceptually frame reality. A key feature of framing Nature in terms of systems is the appreciation given to the multiple interrelationships and interdependencies that exist in the natural world as exemplified by the system dynamics models developed by the influential Club of Rome in their two reports regarding the 'limits to growth' (Meadows et al., 1972; 1992). Another significant development in framing of interdependencies in terms of systems was chaos theory and complexity science. The physicist, Fritjof Capra, for example regards systems principally as interrelated entities constituting the 'web of life' (Capra, 1996).

Capra equates systems thinking with ecological holistic thinking and its accompanying language and understanding, which he calls ecoliteracy. Developing ecoliteracy requires attention to concepts of

interrelatedness and interdependence with insight derived from complexity sciences providing the lingua franca for mediating conversation. Understanding the complex principles of ecology can provide the conceptual devices that are necessary for appropriate ecological conversation in a sustainable ecological world. Perhaps ecoliteracy can provide an antidote to the sense of despair in understanding the Other. But whilst systems thinking is often invoked as an holistic approach towards assuring comprehensiveness, this is only part of the story. One of the hallmarks of systems thinking in practice is a recognition of the need to engage different perspectives.

3. Learning space: engaging with value judgements and social learning

> " Systems thinking may represent the next phase in the evolution of sustainability… We need to flip it around to discussing what is the future we want to create and get people into a different space" (Confino, 2012)
>
> "But what if I don't want to 'get into a different space'? What's going to happen then?" (online blog response to Confino from IanGW, 16th October 2012)

Although complexity science provides an invaluable understanding of reality - codified understandings of what 'is' - they can never be absolute, true representations. Moreover, moving from a powerful descriptive understanding of reality towards appropriate practice requires shifting the framing device of a system from an 'is' mode (of analysis) to an 'ought' mode (of design). This is an ethical jump, requiring value judgements as much as judgements of 'fact'. Confusing the two leads to the 'naturalistic fallacy' - assuming that what is natural in the descriptive world is necessarily 'good' - what Luke Martell (1994) refers to as 'fetishizing the natural'. Judgements of fact (descriptions) are different from, though very much related to, value judgements (norms) – the latter being more associated with the realm of multiple perspectives.

Systems practice involves not only understanding interrelationships but *engagement* with multiple perspectives: "A systems approach begins when first you see the world through the eyes of another" (Churchman, 1968, p. 231). Compare this with, say, an ecosystems approach: "An ecosystems approach is a way of looking at the natural environment throughout your decision making process that helps you to think about the way that the natural environment works as a system." (DEFRA, 2013). The systems approach might be measured by the space it allows for appreciating and developing alternative perspectives rather than just a single perspective.

Making perspectives transparent and appreciating other perspectives, particularly in describing our relationship with non-human nature, confers a particular responsibility on us as humans. Humberto Maturana might describe Churchman's endeavour in terms of practising being epistemologically 'multiverse' (Maturana and Poerksen, 2004, p. 38), as distinct from assuming access to some single ontological 'universe'. The focus moves away from an ontological idea that there is a single reality to be discovered, towards the acceptance that there may be many valid realities depending on the criteria of validity and values applied - an epistemological concept inherent in contemporary systems thinking. The idea can be conveyed in terms of social learning – providing a space for learning through practice: "It is the essential wisdom of the social learning tradition that practice and learning are construed as correlative processes, so that the one process necessarily implies the other" (Friedmann, 1987 p.181). Figure 2 illustrates systems practice as social learning – constituting two inter-activities of framing (understanding interrelationships *and* engaging with perspectives).

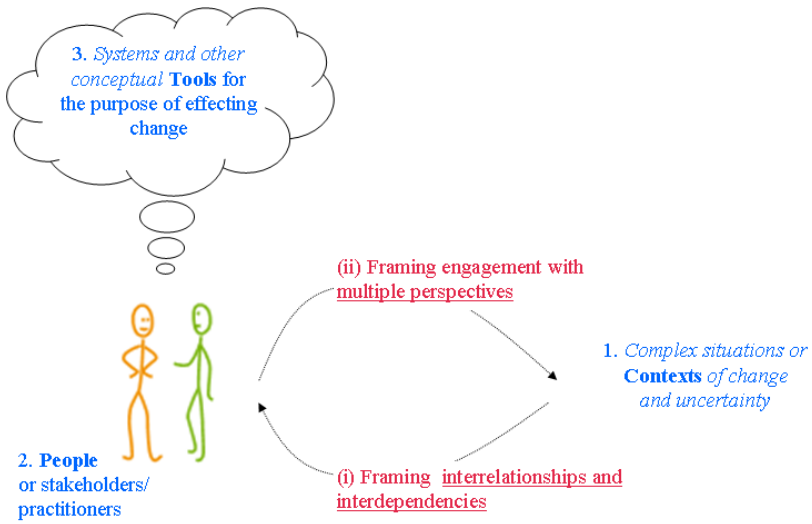

Figure 2 Framing a learning space through understanding interrelationships and engaging with perspectives

The idea of social learning as described by Friedmann (ibid) originated in planning theory in response to more prevalent control-oriented tradition of policy analysis. Social learning with systems thinking is gaining increasing currency for managing environmental issues as a means of engaging people more proactively in a concerted learning space (cf. Collins and Ison, 2009). It arguably provides an antidote to apathy. The framing of interrelationships and perspectives though requires attention also to power relations in the wider political sphere.

4. Political space: reflecting on boundary judgements and partiality

> "…[P]reviously depoliticized areas of decision-making are getting politicized through the perception of risk, and must be opened to public scrutiny and debate. Corporate economic decisions, scientific research agendas, plans for the development and deployment of new technologies must all be opened up to a generalized process of discussion, and a legal and institutional framework for their democratic legitimation must be developed." (Beck, 1998, p. 21)

In this follow-up to his original 1992 publication *Risk Society: Towards a New Modernity* Ulrich Beck here highlights the political connotations of emergent environmental risks. Power relations are integral to the framing process in systems thinking. As Werner Ulrich recognised, all systems are partial – or selective – in the dual sense of (i) representing only a section rather than the whole of the total universe of considerations, and (ii) serving some parties - or interests - better than others (Ulrich 2002 p. 41). Figure 3 illustrates the need for a political space for dealing with partialities – relations of power that circumscribe understandings and practices.

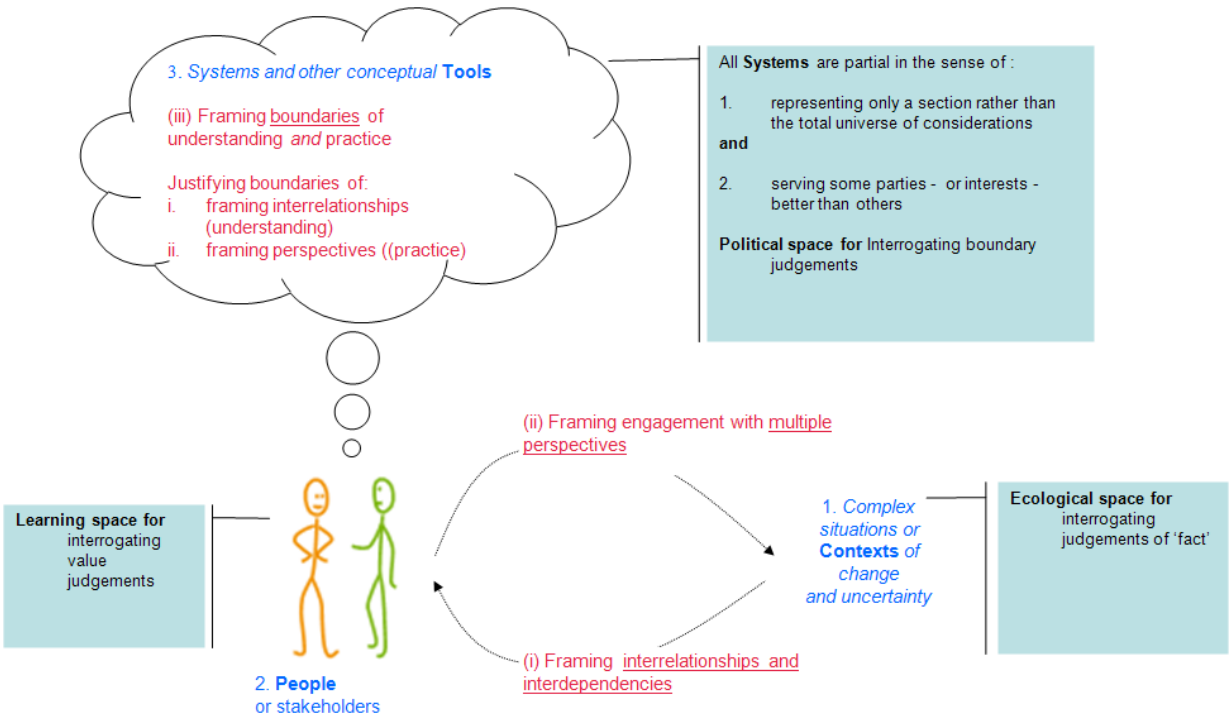

Figure 3 Framing a political space through reflecting on boundary judgements

Systems are often referred to in association with new developments – ecoliteracy associated with complex adaptive *systems*, or the eco*systems* approach - miraculous ways of doing things. But any one set of tools for managing environmental risks, whether systems or other tools, can never quite be the panacea because of the partiality involved – some 'facts' are in and some are left out, some values are privileged and some are marginalised . Systems boundaries inevitably need to be made and questioned on the inevitable limitations of being holistic and pluralistic. Reflecting on boundary judgements can help with countering the cynicism around political forces and associated dominant relations of power.

5. Summmary

> "Systems literacy is not just about measurement. The learning journey up the ladder of complexity—from quarks, to atoms, to molecules, to organisms, to ecosystems—will be made using judgment as much as instruments […] The point of systems literacy is to enable collaborative action, to develop a shared vision of where we want to be." (Thackara, 2005)
>
> "'It won't work. Sustainability is too complicated, and no-one trusts each other'. These were the words of warning we heard from several quarters at the beginning of the Dairy 2020 project in early 2011" (Uren, 2012)

Sally Uren goes on to describe the use of systems innovation which helped to overcome initial problems - typical vicious cycles of despair, apathy and cynicism - in her review of the Forum for the Future project. In this paper I have tried to map out the bare essentials for managing risk using

systems. Systems thinking in practice represents a development of Werner Ulrich's earlier ideas of boundary critique (Ulrich, 2002). The literacy developed can be expressed in terms of promoting continual and meaningful conversation. The 'conversation' works at two levels. One is an expression of boundary reflection, a conversation between our conceptual constructs of real world realities – constructs called 'systems' - and the actual realities being addressed. The other is an expression of boundary discourse, a conversation between people involved with and affected by the systems used to construct and engage with reality (Ulrich and Reynolds, 2010). The systems thinking in practice literacy discussed here and elsewhere (Reynolds, 2011) provides the creative space and language for dealing with systemic risks.

Acknowledgements

The author wishes to thank colleagues for their collaborative work on developing the Open University postgraduate modules *Strategic Thinking: systems tools for managing change* (code TU811) and *Environmental Responsibility: ethics, policy and action* (code TD866) and associated Readers. They helped nurture the ideas formulated in this paper.

The ideas in this paper are a development from a presentation originally made to the RGS-IBG Annual International Conference (London, 1-3 September 2010) *Confronting the Challenges of the Post-Crisis Global Economy and Environment*. Session title: 'Science, politics and the nature of environmental debates'.

References

Beck, U. (1998). *Politics of Risk Society*. The Politics of Risk Society. J. Franklin (ed.). Cambridge, Polity Press**:** 9-22.

Capra, Fritjof (1996). *Introduction* The Web of Life. A New Scientific Understanding of Living Systems. *Chapter 1 pp.3-6; Chapter 2 p.29; Chapter 3 pp.36-37.* New York, Anchor Books.

Churchman, C. West. (1968). *The Systems Approach*. New York: Dell.

Collins, K. and R. Ison (2009). "Editorial: living with environmental change: adaptation as social learning." Environmental Policy and Governance **19**(6): 351-357.

Confino, J. (2012). "The art of systems thinking in driving sustainable transformation." http://www.guardian.co.uk/sustainable-business/systems-thinking-sustainable-transformation (accessed 6th March 2013)

Defra (2013) "Using an ecosystems approach" http://www.defra.gov.uk/environment/natural/ecosystems-services/ecosystems-approach/ (accessed 6th March 2013)

Friedmann, J. (1987). *Planning in the Public Domain*: from Knowledge to Action. New York: Princeton University Press.

Uren, S (2012) "Dairy 2020 – a vision & framework for a sustainable UK dairy industry" Forum for the Future blog http://www.forumforthefuture.org/blog/dairy-2020-%E2%80%93-vision-framework-sustainable-uk-dairy-industry (accessed 6th March 2013)

KPMG International (2012). Expect the Unexpected: Building business value in a changing world (Executive Summary). http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/Documents/building-business-value-exec-summary.pdf. (accessed 6th March 2013)

Levin, S. A. (1998). "Ecosystems and the biosphere as complex adaptive systems." Ecosystems **1**(5): 431-436.

Martell, Luke (1994) *On values and obligations to the environment* extracts from Ecology and Society (pp. 86-225). Cambridge, Polity Press.

Maturana, H., and Poerksen. (2004). *From Being to Doing: The Origins of the Biology of Cognition*. Heidelberg, Germany: Carl-Auer Verlag.

Meadows, D. H., D. L. Meadows, J. Randers, and W. H. Behrens. (1972). *The Limits to Growth: a Report for the Club of Rome's Project on the Predicament of Mankind.* London: Earthscan.

Meadows, D. H., D. L. Meadows, and J. Roberts. (1992). *Beyond the Limits of Growth*. Post Mills: Chelsea Green.

Reynolds, M. (2011). Critical Thinking and Systems Thinking. Critical Thinking. C. P. Horvath and J. M. Forte. New York, Nova Science Publishers**:** 37-68.

Reynolds, M, Blackmore, C., and Smith M. J. (2009). 'Epilogue' in *The Environmental Responsibility Reader* (341-347) Reynolds, M, C Blackmore, and M. J. Smith (Eds.). London, New York, Zed Books

Reynolds, M, and S. Holwell (2010). 'Epilogue: systems approaches and systems practice' in *Systems Approaches to Managing Change: a practical guide.* Reynolds, M, and S. Holwell (Eds.) pp.298-306. London and Milton Keynes: Springer and The Open University.

Said, E. (1979). *Orientalism*. New York Vintage.

Soper, K. (1995). *What is Nature*? Oxford: Blackwell.

Talbott, S. (2004). "Toward an ecological conversation " pp. 37-58 in In the Belly of the Beast. Ghent, New York: The Nature Institute. An original version of this article can be found on NetFuture #27 (Jan. 10, 2002), available at http://netfuture.org/2002/Jan1002_127.html.

Ulrich, W. (2002). Boundary Critique The Informed Student Guide to Management Science. H. G. Daellenbach and R. L. Flood. London, Thomson Learning**:** 41f.

Ulrich, W., and M. Reynolds. (2010). "Critical Systems Heuristics." Pp. 243-292 in *Systems Approaches to Managing Change*, edited by Martin Reynolds and Sue Holwell. London: Springer and The Open University.

Žižek, S. (1989). *The Sublime Object of Ideology*. London: Verso.